

Determining the critical traits associated with lodging in a set of elite breeding lines and Canadian barley varieties



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Team Members

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Funders





Lodging

Lodging is the displacement of the stem from the vertical

Non-lodged



Lodged



Stem Lodging

- when the stem base buckles



Root Lodging

- when the root-soil system fails to anchor the plants



Why study lodging?

- Lowers yield
- Reduces quality:
 - Reduces kernel and test weights, plumps
 - May result in pre-harvest sprouting
- Harvesting
 - Ability to pick the crop up



Lodging

Identification of critical traits

Lodging resistance or tolerance

1. mechanical strength that prevents or reduces lodging and stem breakage
2. ability to quickly recover from lodging
3. ability to continue growth and grain filling despite an alteration in orientation of the plant

	Yield (kg/ha)	Height (cm)	Lodging (1-9 scale)	Maturity (days)
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Results of a Sample of Varieties:

AB Advantage	10659	119	4.52	106
CDC Austenson	10271	105	3.49	101
Amisk	9578	102	4.78	101
Champion	9722	99	2.27	100
AB Cattlelac	9248	115	4.35	100
Canmore	9221	101	2.45	100
Vivar	8837	96	5.63	99
AAC Connect	8734	102	4.57	100
CDC Maverick	6721	118	7.19	103

Variety	Stem length (cm)	Stem diameter (mm)	Culm weight (g)
Amisk	48.2	3.4	1.6
CDC Austenson	58.5	3.1	1.0
Bentley	50.4	3.3	1.0
Falcon	44.2	3.7	1.2
Peregrine	46.7	4.3	1.2
AB Cattlelac	71.8	3.9	1.7
Phoenix	53.2	2.6	0.6

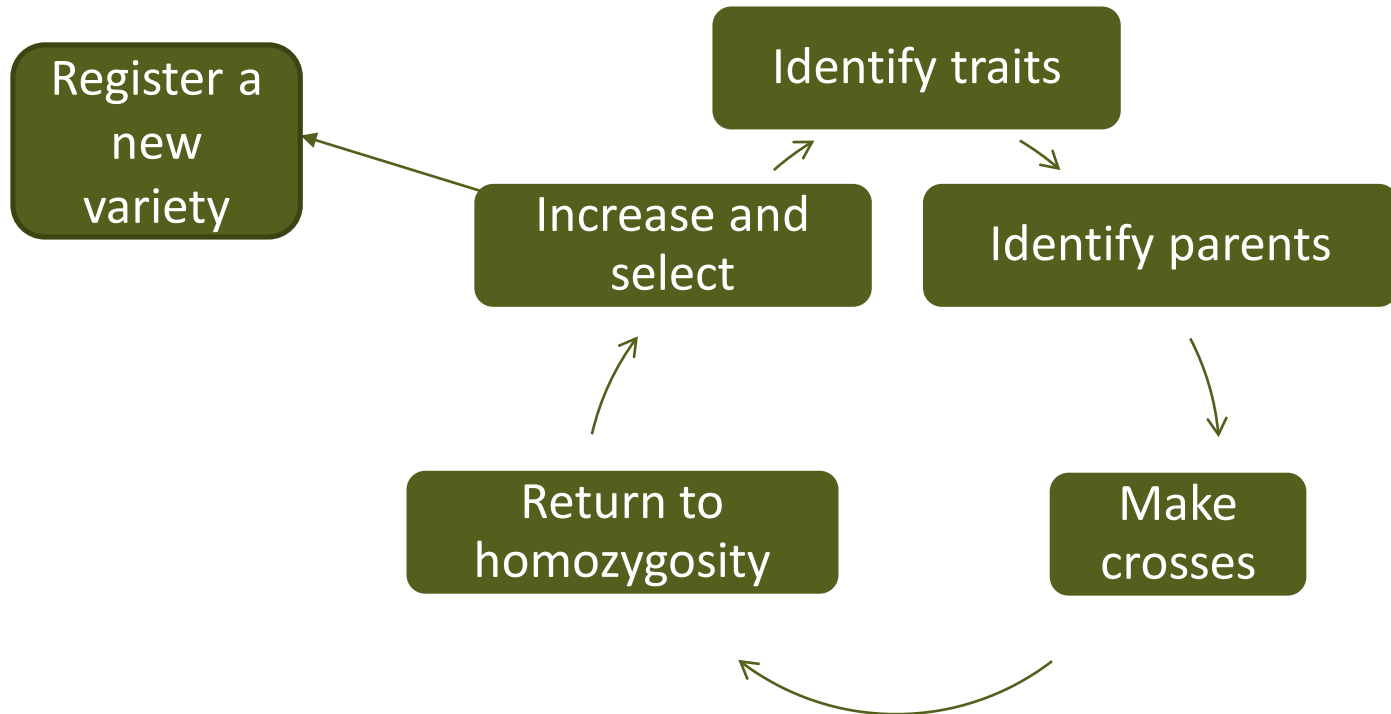
Variety	Cellulose (%)	Lignin (%)	Hemicellulose (%)
Amisk	35	15.3	37.8
CDC Austenson	38	13.9	37.8
Bentley	38	15.5	42.4
Falcon	37	15.9	36.4
Peregrine	39	15.4	38.4
AB Cattlelac	36	14.0	39.7
Phoenix	34	15.8	41.7

Breeding for Lodging Resistance



Application of findings

Breeding Cycle



“Variability exists within the barley germplasm to do further improvement for straw strength through plant breeding.”

Where to from here?

- Further understanding of physiological/morphological/phenological traits and their association with lodging
- Enhance our ability to select for lodging resistance traits earlier in the selection process
- Identify and integrate genomic tools for selection of lodging resistance traits

Breeders are developing tools to select effectively through cooperation with crop physiologists and biotechnologists

Questions?

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